National Institute of Environmental Health Sciences

A panel study in congestive heart failure to estimate the short-term effects from personal factors and environmental conditions on oxygen saturation and pulse rate

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Abstract:

OBJECTIVES: Recent studies suggest that persons with congestive heart failure (CHF) may be at higher risk for short-term effects of air pollution. This daily diary panel study in Montreal, Quebec, was carried out to determine whether oxygen saturation and pulse rate were associated with selected personal factors, weather conditions and air pollution. METHODS: Thirty-one subjects with CHF participated in this study in 2002 and 2003. Over a 2-month period, the investigators measured their oxygen saturation, pulse rate, weight and temperature each morning and recorded these and other data in a daily diary. Air pollution and weather conditions were obtained from fixed-site monitoring stations. The study made use of mixed regression models, adjusting for within-subject serial correlation and temporal trends, to determine the association between oxygen saturation and pulse rate and personal and environmental variables. Depending on the model, we accounted for the effects of a variety of personal variables (eg, body temperature, salt consumption) as well as nitrogen dioxide (NO2), ozone, maximum temperature and change in barometric pressure at 8:00 from the previous day. RESULTS: In multivariable analyses, the study found that oxygen saturation was reduced when subjects reported that they were ill, consumed salt, or drank liquids on the previous day and had higher body temperatures on the concurrent day (only the latter was statistically significant). Relative humidity and decreased atmospheric pressure from the previous day were associated with oxygen saturation. In univariate analyses, there was negative associations with concentrations of fine particulates, ozone, and sulphur dioxide (SO2), but only SO2 was significant after adjustment for the effects of weather. For pulse rate, no associations were found for the personal variables and in univariate analyses the study found positive associations with NO(2), fine particulates (aerodynamic diameter of 2.5 microm or under, PM(2.5)), SO2, and maximum temperature, although only the latter two were significant after adjustment for environmental effects. CONCLUSIONS: The findings from the present investigation suggest that personal and environmental conditions affect intermediate physiological parameters that may affect the health of CHF patients.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution

Air Pollution: Interaction with Temperature, Ozone, Particulate Matter, Other Air Pollution

Air Pollution (other): SO2, NO2, CO

Geographic Feature: ☑

resource focuses on specific type of geography

Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Cardiovascular Effect

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): oxygen saturation;pulse rate;blood pressure;self-reported indices of health (eg, shortness of breath) in persons with congestive heart failure

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified